

# In-transit sentinel lymph nodes predicted by F-18 Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography

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## Abstract

Although the in-transit lymph node is a well-known issue in malignant melanoma, it is not documented sufficiently in breast cancer. In this case report an in-transit lymph node demonstrated by both PET/CT and sentinel lymph node mapping and diagnosed by pathology is reported.

**KEY words:** in transit, sentinel, breast, pet, scintigraphy

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## Introduction

Sentinel lymph node is theoretically the first lymph node to drain the tumor. The pathologic examination of the sentinel lymph node presents the further lymph nodes, thus the lymph nodal status of the primary tumor [1]. Previous studies have provided sufficient evidence that the sentinel lymph node analysis predicts the local lymphatic status of the tumor and there is a low risk of skip secondary lymph node invasion [2], thus recurrence, in the case of negative sentinel lymph node [3]. In case of a positive sentinel lymph node, axillary dissection has to be performed [4]. There are several sentinel node identification methods, such as blue dye and radionuclide sentinel lymph node imaging. These methods may be performed together and have low false-negative rate; however, there is a learning curve and experience is required [5]. Another new and not well-documented issue in sentinel lymph node imaging is the in-transit lymph node. In-transit or intramammary lymph node is the lymph node that is surrounded by the breast tissue [5, 6]. The in-transit lymph node as a sentinel lymph node is an unknown part of the procedure. This is the first case report, as far as we know, with intramammary in-transit lymph node scintigraphy imaging in combination with PET/CT imaging.

## Case Report

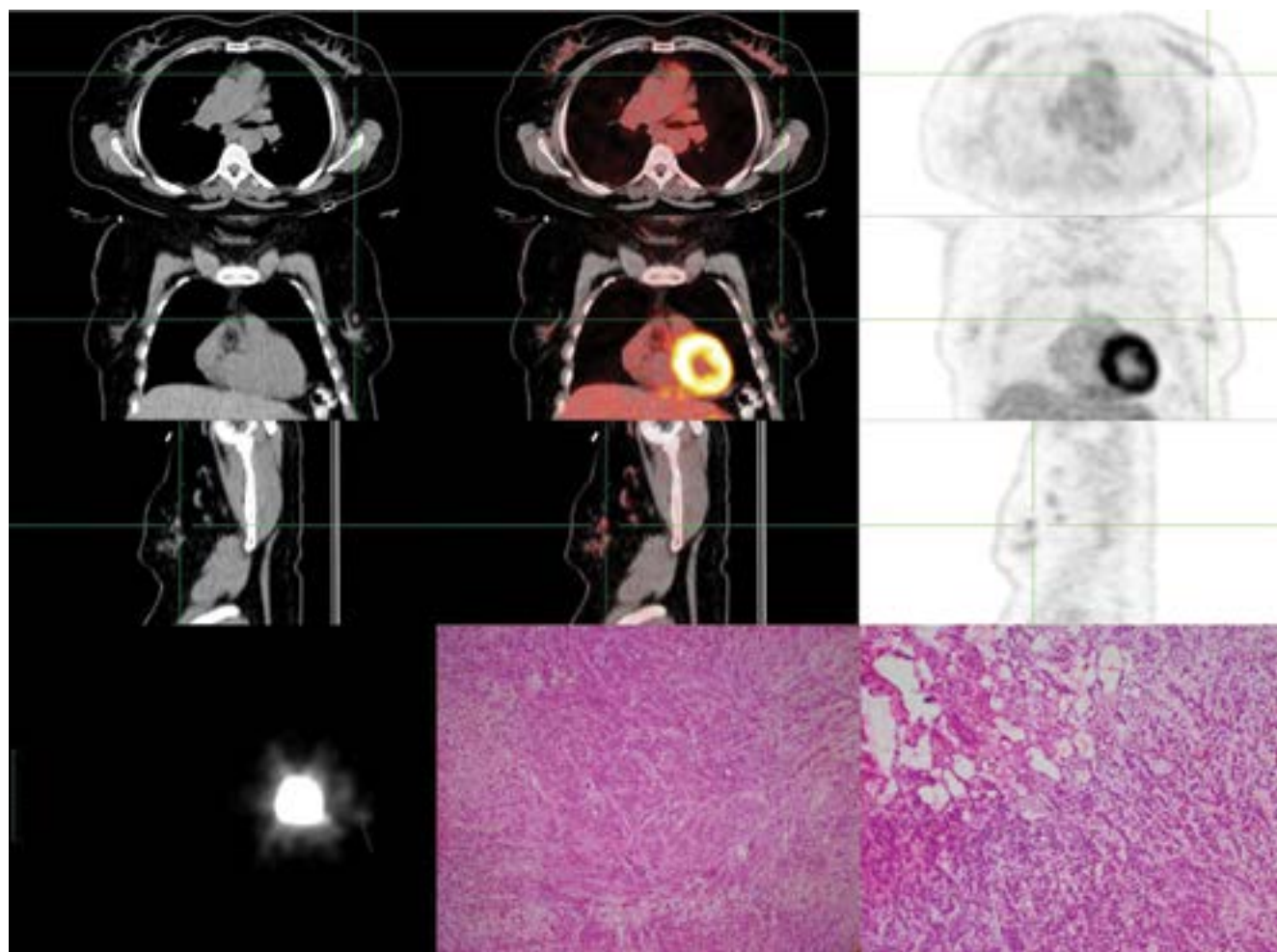
**Case 1.** A 69-year-old female patient with identified right-breast carcinoma was referred for F-18 FDG PET/CT for staging. The F-18 FDG PET/CT images of the patient showed retroareolar lesion with significantly increased FDG uptake (2 x 1.5 cm; SUVmax = 12.6) and additional intramammary lymph nodes (the largest was 9 mm in diameter) without significant FDG uptake (Fig. 1). At the day of operation the sentinel lymph node imaging showed intramammary sentinel lymph node and during the operation the intramammary lymph node was excised at the border of axilla. The lymph node was positive for tumor and axillary dissection showed multiple (n = 6) positive nodes (Fig. 1).

**Case 2.** The patient was 58 years old and left-breast tumor showed invasive carcinoma; therefore, F-18 FDG PET/CT imaging was performed for staging. The imaging showed left upper inner quadrant hypermetabolic lesion (18 x 18 mm, SUVmax = 25.6) and millimetric lymph node in the parenchyma with FDG uptake and axillary lymph node with FDG uptake (SUVmax = 3.5 and SUVmax = 4.2, respectively) (Fig. 2). Sentinel lymph node imaging showed in-transit intramammary lymph node in early phase (dynamic) of the study, and in the late phase also additional multiple sentinel lymph nodes in axilla were observed (Fig. 2). All sentinel (n = 3) and axillary lymph nodes (n = 3) were positive in the histopathology (Fig. 2).

## Discussion

There is very limited data about the in-transit lymph nodes in breast cancer. There are few cases reported in the literature and

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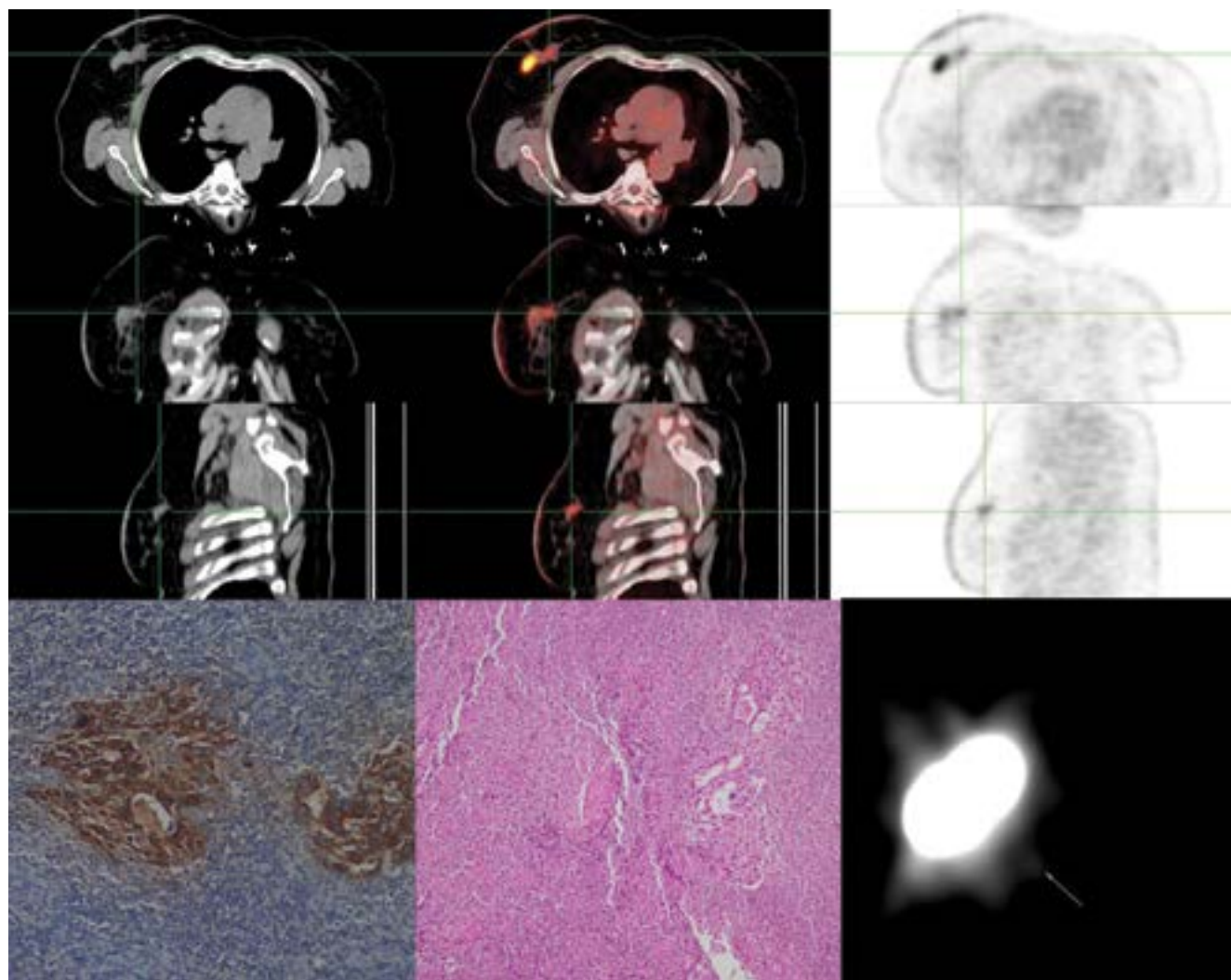
**Figure 1.** The F-18 FDG PET/CT images of the first patient with lesion suspicious of in-transit lymph node, adjacent to the primary tumor in outer upper quadrant of the left breast in the transaxial, coronal and sagittal projection. B. Tc-99m nanocolloid sentinel lymph node dynamic images that show the in-transit sentinel lymph node activity adjacent to the injection site. C. Pathology images of the lymph node sections stained with hematoxylin and eosin in x40 and x100 magnification

some review articles [5]. The in-transit lymph nodes are smaller diameter and closer to the lymphatic channels and the primary tumors. Although they are surrounded by the breast tissue and not exactly axillary lymph nodes, they are considered axillary lymph nodes in staging. They may be not recognized by the gamma camera imaging or the surgeon due to close proximity (shine-through effect) and small volume and underestimated; however, previous reviews have demonstrated that they might be a source of local recurrence [5]. As in the case described by van Deurzen et al., in this case report we presented a patient with in-transit lymph node that was observed in first few second and disappeared immediately after identification. Also axillary lymph nodes of the patient were positive as well. In the other patient, the intramammary lymph node was the single sentinel lymph node and the axillary lymph nodes were also positive. However it is problematic to determine the in-transit or intramammary lymph node during the scintigraphy, because it requires significant consideration by the physician.

In previous studies about the in-transit lymph node in malignant melanoma the incidence was reported to be between 3–10% [6].

In 14–20% of these cases, the in-transit lymph nodes were found to be positive and considered one of the local recurrence causes in malignant melanoma [7]. Van Deurzen et al. suggested that these lymph nodes in breast cancer might also have major clinical impact [5].

Previous case reports have pointed out that in-transit lymph nodes in intramammary region might develop from the lymphatic emboli and be directly connected to the primary tumor [8] and might be one of the causes of false negative sentinel lymph node examinations, which can be as high as > 10% [9]. Obviously, it is difficult to localize the intramammary lymph nodes because of surrounding normal breast tissue and they usually are not radioactive and blue. In the case of breast conserving surgery, the node may be missing. Scintigraphy also has disadvantage of shine-through effect originating from the primary tumor injection site. However, in our experience the intramammary lymph nodes were determined by the first diagnostic procedure F-18 FDG PET/CT. This is the first study that demonstrates the intramammary lymph nodes by both PET/CT and scintigraphy.



**Figure 2.** A. The transaxial, sagittal and coronal projection PET, CT and fusion images of F-18 FDG PET/CT of the second patient demonstrating the suspicious hypermetabolic lesion medial to the primary tumor in upper outer quadrant of the right breast B. Pathology section of the lymph node with immunostaining in x100 and hematoxylin eosin in x40 magnification C. Sentinel lymph node dynamic images showing the in transit lymph node activity (arrow)

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